Stakeholder Considerations for Recreation and Forest Management in the Sunpine Forest Products Forest Management Agreement Area of Alberta

D.O.T. Watson
and B.L. McFarlane

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ABSTRACT

This study examined the values and attitudes of two stakeholder groups for the Clearwater Forest Area in Alberta: campers using the area and the public living in or near the area. Data were collected by means of a mail survey conducted in 2001. The area is an important recreation destination for the local public, and most of the local public use the area for camping. Both the public and campers had favorable attitudes toward random camping, viewing it as having little environmental impact and as being a unique experience that is a right and tradition for Albertans. However, unrestricted use of off-highway vehicles was viewed by both groups as having negative environmental impacts. Both groups exhibited a strong biocentric orientation of forest values, supporting existence values, the inherent worth of forests, and spiritual aspects of forests. However, the stakeholders also showed some support for the use of forests by humans. In terms of their beliefs about the sustainability of Alberta's forests, respondents believed that forests are being managed for multiple benefits but viewed timber supply and public involvement as inadequate. They viewed the oil and gas industry as the greatest threat to Alberta's forests. The cumulative effects from all uses of the forest and the forest industry were also viewed as a threat. Water quality, ecosystem integrity, and cumulative effects were the top specific concerns related to forest management. Government and industry were the least trusted sources of information on forest management, whereas scientists were the most trusted. The implications for these findings in terms of public involvement and communications are discussed.

RÉSUMÉ

Cette étude porte sur les valeurs et attitudes de deux groupes intéressés par région de la forêt de Clearwater, en Alberta : les campeurs qui fréquentent la région et le public qui y vit ou qui vit à proximité de celle-ci. Les données ont été recueillies par enquête postale en 2001. Cette région est un lieu de villégiature important pour la population locale, qui y pratique très souvent le camping. Le grand public comme les campeurs ont des attitudes favorables au camping sauvage, dont ils estiment qu'il a peu d'effets sur l'environnement et qu'ils considèrent comme une activité unique qui est un droit et une tradition pour les Albertains. Cependant, les deux groupes considèrent l'utilisation libre des véhicules tout-terrain comme ayant un effet négatif sur l'environnement. Les deux groupes font preuve d'une orientation fortement biocentrique dans leurs valeurs forestières, croient en la valeur des forêts en soi et en leur dimension spirituelle. Cependant, les intéressés sont aussi quelque peu favorables à l'utilisation de la forêt par l'homme. Pour ce qui est de la viabilité des forêts de l'Alberta, les personnes interrogées estiment que les forêts sont gérées à des fins multiples mais jugent que la situation laisse à désirer quant à l'approvisionnement en bois d'œuvre et à la participation du public. Ils

considèrent l'industrie pétrolière et gazière comme la plus grande menace pour les forêts de l'Alberta. Ils estiment que la forêt est aussi menacée par les effets cumulatifs de tous les usages qui en sont faits y compris l'activité de l'industrie forestière. La qualité de l'eau, l'intégrité de l'écosystème, et les effets cumulatifs sont parmi leurs principales préoccupations quant à la gestion des forêts. Le gouvernement et l'industrie sont les deux sources d'information jugées les moins crédibles en matière de gestion des forêts, et les scientifiques la source la plus crédible. Les auteurs traitent par ailleurs de la signification de ces constatations quant à la participation du public et aux communications.

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INTRODUCTION

One of the major challenges facing the forest industry is the measurement and incorporation of nontimber uses and public values into management planning and the identification of criteria and indicators of nontimber values for sustainable forest management. Public values, the attitudes and beliefs of stakeholders, and nontimber use of the forest have been identified by Sunpine Forest Products Ltd., a major industrial user of the Clearwater Forest, as important issues to consider as part of their forest management strategies. Management issues related to nontimber use of the Sunpine Forest Management Agreement (FMA) area include conflicts between industrial and recreational uses, conflicts between different recreational user groups, and the environmental impacts and access to forested lands associated with random camping and off-highway vehicle (OHV) use. Achieving sustainability on a land base such as the Sunpine FMA area, which has varied and sometimes conflicting uses, requires an understanding of the relevant stakeholders, their values and attitudes, and how they will be affected by natural resource management decisions.

One large and obvious group of users of the forest is campers, whether they camp in designated campgrounds or engage in random camping (i.e., camping on Crown land that is not designated as a campground, with no services or facilities and no camping fee).

Camping is often not the only goal of a trip to the forest, and many campers combine camping with other recreational activities such as hiking, fishing, horseback riding, or using OHVs (McFarlane et al. 1996b; McFarlane et al. 1999; McFarlane et al. 2003). Therefore the values and attitudes of campers should be a good indicator of those of all recreational users.

Members of the general public should also be considered stakeholders in the forest, whether or not they use it, since many nonuse values and benefits are derived from the forest. Forests in Alberta are predominantly on public land owned by the province, and as such all citizens should potentially have a voice in forest management.

Other studies of forest stakeholders in Alberta have shown that recreational users of the forest (campers and hunters), the general public, and members of environmental organizations share similar value orientations and concerns about forest management (McFarlane and Boxall 1999, 2000). These studies have also found that forest managers and those who provide most of the input to forest management on behalf of the public differ from these stakeholders by having a more utilitarian approach to forest management and a more optimistic view of forest management in terms of environmental concerns, timber supply, and public involvement.

This study examined the values and attitudes of two stakeholder groups, campers using the Clearwater Forest Area and residents living in or near the Clearwater Forest Area. The following questions were addressed:

- What recreational activities do local residents pursue in the Sunpine FMA area?
- What are the stakeholders' attitudes toward random camping, and what are their concerns related to OHV use?
- What are the forest value orientations of these stakeholders?
- What are the stakeholders' attitudes toward sustainable forest management in Alberta?
- What do these groups perceive as threats to the forest in the Sunpine FMA area?
- How knowledgeable are these stakeholders about forest management issues and basic forest-related facts?
- Where do they get their information on forest management, and what sources of information do they trust?

Study Area

The study area, the Clearwater Forest Area, roughly corresponded to the Sunpine Forest Products FMA area. The Sunpine FMA area is 507 000 ha of public land along the eastern slopes of the Canadian Rockies in western Alberta. The FMA (Fig. 1) is roughly bordered to the north by the Nordegg River, to the west by the Bighorn Wildland Recreation Area, to the south by the Red Deer River, and to the east by the towns of Rocky Mountain House, Strachan, Caroline, and Sundre. (The Bighorn Wildland Recreation Area is contiguous with the Whitegoat (44 457 ha) and Siffleur (41 215 ha) wilderness areas, which are open to backpacking, hiking, mountain biking, and camping but not hunting, fishing, motorized vehicles, or horses. Kootenay Plains Ecological Reserve (3 439 ha) is found between the Whitegoat and Siffleur wilderness areas and has similar use restrictions. Jasper National Park is north of this area, and Banff National Park is to the west). The FMA is in that portion of the southwest region provincial administrative area that was formerly known as the Rocky-Clearwater Forest. The area has a long history of natural resource use, beginning with settlement in the early 1900s and forestry and oil and gas development since the 1950s. The current demands for use include cattle grazing, hydroelectric power generation, forestry, oil and gas development, and many types of outdoor recreation.

Data Collection

A mail survey was used to obtain information on forest value orientation and attitudes of a group of campers that use the Sunpine FMA, as well as a sample of the general public living within the region surrounding the FMA. The camper sample consisted of individuals who had been interviewed at their campsites in the region during the summer of 2000. Campers were interviewed at Crimson Lake Provincial Park, in 13 provincial recreational areas (PRAs), and at random camping sites (see McFarlane et al. [2003] for details about the on-site survey process). As part of the interview, campers were asked if they would be willing to receive a survey in the mail and a total of 1 200 campers agreed to participate in the mail survey.

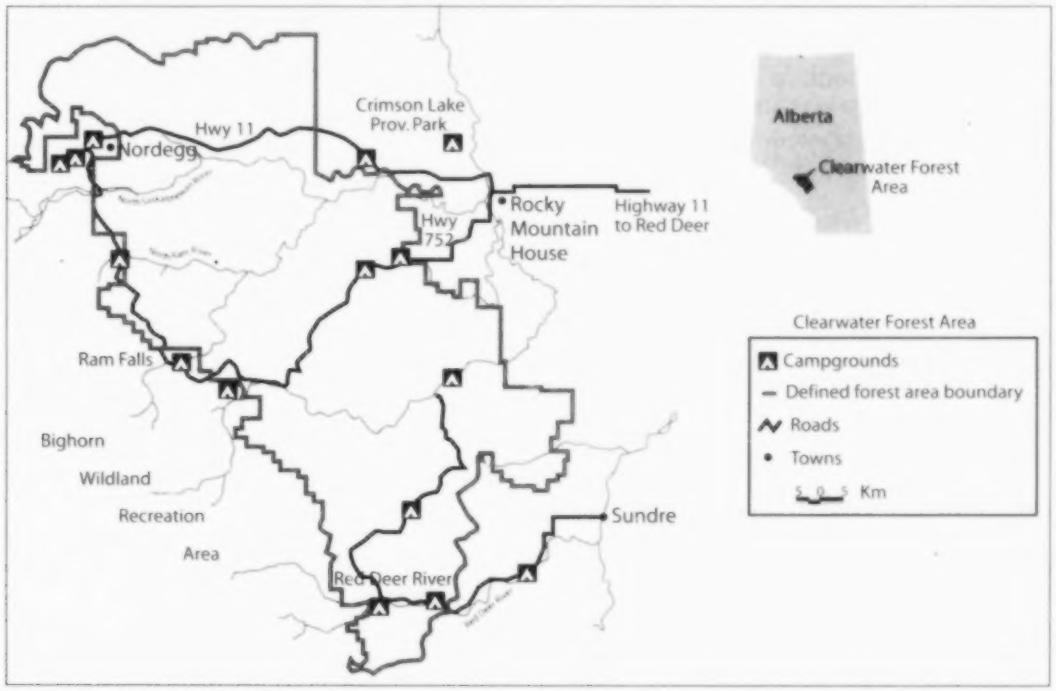

Figure 1. Location of the Sunpine Forest Management Agreement area and the study area (courtesy of Sunpine Forest Products Ltd).

The sample of the public was obtained by telephone solicitation of individuals 18 years of age or older living within or near the study area. Specifically, the sample geography was limited to towns east of the British Columbia border, north of Highway 584 through Sundre, and west of Highway 2 between Olds and Ponoka. The northern border was a road route between Ponoka and Drayton Valley (south of Highway 20 between Ponoka and Rimbey, west of Highway 20 between Rimbey and Breton, and south of Highways 39 and 620 through Drayton Valley). Red Deer residents were limited to 20% of the sample to ensure that the sample included all communities in the region. The telephone solicitation process required 3 490 dial-ups (including redials), with 1 380 households contacted, to achieve 600 willing participants (43.5% participation rate).

The surveys were pretested with two groups. The first pretest was conducted with the Sunpine Forest Products public advisory group, with the participation of campground operators in the region. The second pretest was conducted with nonforestry staff (administrative personnel and Environment Canada chemists) at the Northern Forestry Centre in Edmonton.

The initial survey package was mailed to both samples on 27 June 2001, and a follow-up postcard was sent on 11 July 2001. A second survey package was mailed to nonrespondents during the last week of July 2001. As an incentive for participation, a draw for five $50 gift certificates from Canadian Tire was held for respondents from each of the samples.

The two surveys had a number of questions in common, although the camper survey went into more detail in several areas. Both groups were asked how long it had been since they first started camping and how many trips per year, on average, they took to various types of campgrounds (national parks, provincial parks, PRAs, commercial campgrounds, and random camping sites). Respondents rated a series of statements related to random camping on a scale of 1 (strongly disagree) to 5 (strongly agree). In the survey, random camping was defined as follows: "Camping on Crown land that is not designated as a campground. There are no services or facilities and no camping fee is charged." The attitudinal statements were designed to solicit information about both positive and negative aspects of random camping.

The surveys also included questions on value orientation, attitudes toward forest management, concerns over the impact of forestry operations on the environment, the effect of other recreational and industrial uses of the forest, and the effect of unrestricted motorized recreational OHV access.

Value orientation was measured by means of a series of statements used in previous studies of forest stakeholders in Alberta (McFarlane and Boxall 2000). Respondents indicated their level of agreement with the statements on a scale of 1 (totally disagree) to 5 (totally agree). They also had the option of choosing "not sure." For reporting purposes, the "not sure" responses were converted to a value of 3 (i.e., neutral) before the mean ratings were calculated. The biocentric statements were categorized as existence values, inherent worth, or spiritual values; the anthropocentric statements related to economic or utilitarian values.

To provide an indication of stakeholders' beliefs about the sustainability of forest management in Alberta, a series of statements related to managing for multiple benefits, the sustainability of timber yield, the economic benefits of forestry, and public involvement were presented. Respondents rated 14 statements on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree); a "not sure" category was also included. For reporting purposes, the "not sure" responses were converted to a value of 3 (i.e., neutral) before mean ratings were calculated. The next question asked respondents how concerned they were about the potential negative impacts of forestry operations in the Clearwater Forest Area, with responses ranging from 1 (not at all concerned) to 5 (very concerned).

Respondents rated 10 options in terms of perceived threat to the environmental quality of Crown lands. The options, representing industrial and recreational activities, were rated on a 5-point scale ranging from 1 (not at all threatening) to 5 (very threatening). A similar series of 5 options was used to determine the concern of respondents about OHV use in the forest.

The survey also included questions about knowledge of forest management and forest management issues, the type of media normally used to obtain information about forest management, and trusted sources of information.

Two measures were used to assess the respondents' level of knowledge about forest management in Alberta. First, respondents rated how well informed they thought they were about forest management issues in Alberta. Ratings were based on four categories ranging from not at all informed to very well informed. A "not sure" category was also included but was not used in the analysis with a four-point scale, there is no category equivalent to the "neutral" of the five-point scales; only 15 of 858 campers and 13 of 440 members of the general public answered "not sure". Second, familiarity with forest-related facts was assessed on the basis of 10 statements developed by McFarlane and Boxall (2000). Respondents were asked to indicate if the statements were true or false or if they were not sure.

To understand where campers and the public get their information about forest management, respondents were asked what media they used to obtain information, what source (group or person) they relied on for information, and their level of trust in various sources of information. This type of information is helpful in designing communication efforts aimed at improving stakeholder knowledge.

The public was also asked about recreational activities they had pursued in the study area. Campers had been asked this question during the on-site interviews conducted in 2000. The campers were asked more specific questions concerning what camping means to them, what new camping experiences or types of parks they would like to see created in the region (results for these camping-specific questions were reported by McFarlane et al. [2003].), and what forest management activities they would like to learn more about.

The last section of both surveys solicited demographic information including age, sex, education, household income, participation in environmental or outdoor organizations, and whether household income depended upon employment in a natural resource sector.

Frequency analysis was conducted on the responses to these questions, with comparisons between the two samples where possible.

RESULTS

Survey Response

A total of 857 completed responses from the camper sample and 440 responses from the general public were received. Not all of the questions were answered by all of the respondents. After adjustment for questionnaires that could not be delivered (bad address, moved, etc.) the response rates for the two groups were 76.6% for the camper sample and 75.0% for the general public.

Demographic Characteristics

One of the first areas of interest was to determine if the two samples (the public and the campers) were distinct from one another. (Within the camper sample, 44% of respondents lived within the same local region as the general public. A separate analysis, not reported here, found that for nearly all variables, the campers were more similar to other campers than to the regional population. For this reason, the campers from the local region were kept within the camper sample.)

There were two aspects to this comparison of demographic results. The first was to determine if there were significant differences between the two samples, and the second was to compare the general public sample with data from the Canada Census to ensure that the sample represented the regional population.

There were significant differences between the public and camper samples in terms of demographic variables. There was a complete reversal in the gender mix of the sample (the public sample was 60% female, whereas the camper sample was only 30% female), the public sample was older than the camper sample (Table 1), and there were significant differences in educational level (Table 2) and income (Table 3). These differences may be a product of the method used to solicit the two samples. Telephone solicitation depends on someone being home at the time the call is made. A retired person is more likely to be at home than a person of working age who has children with activities outside the home. Retired people would

also be more likely to report a low household income and would not have needed as high an education to pursue a career that started many years ago. As well, despite efforts to maintain a good gender mix, when a family group is approached at a campsite, the father is more likely to assume the "group leader" role, and a group of male friends is more likely than a group of female friends to be camping together.

Data for the general public sample was compared with population information from the 1996 Census of Canada (Statistics Canada 1998), in terms of sex, household income, and age (data from the 2001 Census were not released until after completion of this analysis but no large differences in the variables of interest are anticipated). Comparing the sample with census data on education was not possible, because of different educational categories. The comparison for income was also problematic, because of differences in income categories. The census clearly requests that income from self-employment and agriculture be "net" income. Much of the survey area is agricultural, and the question used in this study asked for "total household income." The distribution of income in the sample was shifted toward higher-income earners (relative to the census), but it is not possible to know if the sample is actually not representative or if the difference is due to respondents reporting gross income on the survey and net income on the census. Although the disparity in age distribution between the census and the public sample was not significant ($\chi^2 = 0.22$), the gender mix was. For this reason, in the analysis outlined below the gender mix was weighted to reflect the true population mix (50:50). Because 9 respondents did not indicate sex, the weighted sample size was reduced by 9.

Table 1. Age distribution[a]

Age (years)	Sample; % of respondents	
	Public (n = 430)	Camper (n = 857)
< 25	6.4	6.3
25–34	18.2	18.8
35–44	25.5	34.7
45–54	20.9	25.1
55–65	14.0	10.5
> 65	14.9	4.6

[a] $\chi^2 = 54.4$, df = 5, $p < 0.0001$.

The camper sample was not weighted, because it was assumed that the study sample was representative of the entire camper population, and there is no information available on the distribution of variables in this population.

As a measure of respondents' interest in the environment and potential personal dependence on the forested region, they were asked about membership in environmentally oriented organizations and household dependence on resource-based employment. Overall, there was very little participation in environmental organizations, with less than 30% of respondents belonging to any of the three categories listed (Table 4). There was a notable difference between the samples in terms of membership in hunting or fishing organizations (9.6% of the public and 18.4% of the campers). Other environmental or conservation organizations held roughly 8% of each sample and natural history clubs roughly at 2%.

About half of each sample had no household members working in resource-related sectors (Table 5). However, roughly 40% of each sample had a household member working in the oil and gas sector (42.5% of the public and 38.5% of campers). The forestry sector was not an important employer for either group (12.1% of the public and 9.2% of campers).

Table 2. Level of educational achievement[a]

Education level	Sample; % of respondents	
	Public (n = 419)	Camper (n = 839)
Grade 9 or less	5.7	3.1
Some high school	11.0	7.2
High school graduate	25.1	22.7
Technical school or community college	32.0	42.8
Some university	10.2	8.6
University degree (bachelors)	12.8	10.1
Some graduate studies	2.1	2.5
Graduate degree	1.2	2.9

[a] $\chi^2 = 24.7$, df = 7, $p = 0.0009$.

Table 3. Income level[a]

Income level ($)	Sample; % of respondents	
	Public (n = 370)	Camper (n = 741)
< 10000	4.0	0.5
10000 to 19999	6.7	1.4
20000 to 29999	10.8	4.6
30000 to 39999	14.8	9.9
40000 to 49999	11.3	13.1
50000 to 59999	12.9	12.3
60000 to 69999	10.2	13.8
70000 to 79999	6.7	11.8
80000 to 89999	11.0	11.6
90000 to 99999	3.0	6.5
≥ 100000	8.4	14.6

[a] $\chi^2 = 71.2$, df = 10, $p < 0.0001$.

Table 4. Membership in environmentally related organizations[a]

Type of organization	Public sample		Camper sample	
	%	n	%	n
Natural history or birdwatching	2.1	410	2.1	778
Hunting or fishing	9.6	412	18.4	815
Other environmental or conservation organizations	8.9	416	8.4	793

[a]Data shown are percent of respondents and total number of respondents.

Table 5. Household dependence on natural resource sectors

Type of employment	Sample; % of respondents	
	Public (n = 816)	Camper (n = 407)
Forestry	12.1	9.2
Mining	1.1	4.0
Government natural resource agency	3.2	3.2
Oil and gas sector	42.5	38.5
No dependence on natural resource sector	49.9	54.5

Camping Experience

Essentially all respondents in the general public sample were or had been campers. In response to the question concerning how long they had been camping, all respondents stated that they had camped at some time in the past. However, the survey did not include an option for never having camped. Thirty-nine respondents did not answer this question, and these might have been people who had never camped. There was a significant difference between the two samples in terms of years of camping experience (Table 6). On the whole the campers had been camping longer than the public sample, for example, only 2.7% of the campers had less than 6 years experience, whereas 7.4% of the public sample had this level of experience. However, more than 50% of both groups had been campers for more than 25 years.

Table 6. Years of camping experience[a]

Years of experience	Sample; % of respondents	
	Public (n = 409)	Camper (n = 844)
1–5	7.4	2.7
6–10	6.7	5.4
11–15	6.4	7.1
16–20	12.2	12.9
21–25	10.9	13.2
> 25	56.4	58.6

[a] $\chi^2 = 16.75$, df = 5, $p = 0.005$.

Responses to the question about trip frequency and campground type also revealed differences between the two samples (Table 7). The general public took fewer trips overall, and their trips were more likely to be to developed campgrounds, such as the national or provincial parks. This may reflect the sample selection method for the campers, who were identified predominantly at PRAs and random camping sites. Only one provincial park was sampled, and national parks were not sampled (see McFarlane et al. [2003] for an analysis of campground preference between the three types of camping opportunities). Among the public sample, the majority took 5 or fewer trips per year (11.4% usually took no camping trips and 47.3% took 1 to 5 trips annually; Table 7). The proportion of the public that normally took no trips could perhaps be considered former or occasional campers. In other words, they had camped at some time but either had stopped camping or did so infrequently. In contrast, 67.3% of the campers took more than 5 trips a year. Although a large component of the general public (52.5%) undertook random camping, this proportion was considerably smaller than within the camper sample (65.9%).

These results suggest that most of the residents living in or near the Clearwater Forest Area take at least one camping trip each year. The differences between the public and camper samples in types of campgrounds used and total annual trips suggest that the general public sample represented is a different type of camper than the camper sample but that the two groups may be subsets of the same camping population.

Table 7. Frequency of annual camping trips by campground type (presented as percent of respondents)

	Public sample (n = 419)				Camper sample (n = 851)			
	0 trips	1–5 trips	6–15 trips	> 15 trips	0 trips	1–5 trips	6–15 trips	> 15 trips
National parks[a]	50.0	47.3	2.1	0.2	43.1	55.0	1.8	0.5
Provincial parks[b]	43.8	49.8	4.9	1.6	37.5	57.3	4.5	0.7
Provincial recreation areas[c]	50.2	45.7	2.7	1.4	26.7	61.8	10.0	1.5
Commercial campgrounds	67.0	30.1	2.1	0.9	72.0	26.2	1.6	0.2
Random camping[d]	47.5	41.5	7.3	3.7	34.1	41.6	15.5	9.1
Total trips to all locations[e]	11.4	47.3	28.5	12.8	0.7	32.0	46.2	21.1

[a] $\chi^2 = 7.98$, df = 3, $p = 0.046$.
[b] $\chi^2 = 7.99$, df = 3, $p = 0.046$.
[c] $\chi^2 = 78.77$, df = 3, $p < 0.0001$.
[d] $\chi^2 = 38.3$, df = 3, $p < 0.0001$.
[e] $\chi^2 = 126.25$, df = 3, $p < 0.0001$.

Recreational Activities in the Clearwater Forest Area

The general public was asked what recreational activities they pursued in the Clearwater Forest Area. The camper survey did not include this question, since campers had been asked a similar question during the on-site interview. The list of options was similar in the two surveys. For the campers, the question applied only to the camping trip when they were interviewed. For the public, however, the activities could be the primary goal of a trip to the area and not necessarily part of a camping trip. Thus, a direct comparison between the samples would not be valid.

The most common activity among the public was "just relaxing" (88.1% of respondents) (Table 8). A substantial proportion of the public (80.0%) camped in the Clearwater Forest Area. The only other pursuit mentioned by more than 50% of respondents was sightseeing in natural areas (55.3%). Fishing, swimming, day hiking, photographing nature, and viewing wildlife were also popular. OHV use, which forest managers believe to be increasing in the study area, was pursued by 23.7% of the public.

When asked to identify the activity in which they participated most often, respondents reported camping (25.7%) and relaxing (21.8%) at the highest levels. No other single activity was rated as most popular by more than 10% of the public (Table 9).

Attitudes toward Random Camping

There were significant differences between the two samples on all but 5 of the 19 statements (Table 10). These differences were, for all but one statement, due to the degree of agreement or disagreement. That is to say, in only one case (fire risk) did one group mainly agree while the other mainly disagreed. Overall, the campers were more likely to have more positive attitudes toward random camping than the public.

The statements were grouped into 3 categories: environmental effects, camping style, and enforcement. Within the environmental effects category were four positive statements, such as "Random campers can help monitor gradual environmental changes" and "Random camping allows people to be more in touch with nature," as well as four negative statements, such as "Random camping increases the risk of forest fire" and "Random camping pollutes rivers and streams." Neither group agreed with statements implying that random camping had a negative effect on the environment, except for the statement that random camping increases the risk of forest fires. In that case, the public somewhat agreed with the statement (mean rating of 3.3) whereas the campers somewhat disagreed (mean rating of 2.9); this difference was statistically significant. The one statement in this category for which there was no significant difference between the two groups was "Random camping allows people to be more in touch with nature"; both groups agreed with this statement.

The category concerning camping style contained six positive statements, such as "Random camping is a good way to test outdoor skills" and "Random camping is an important tradition for many Albertans." There were also two negative statements: "Many random campers make excessive noise and cause trouble" and "Generally, I do not have much in common with random campers." On all but one statement, the responses reflected a positive attitude toward random camping. For example, both groups agreed that random camping is a unique experience, allows more freedom than is the case at traditional campgrounds, is a basic right of Albertans, and is an important tradition for Albertans. Both groups disagreed slightly with the statement "In order to feel like I am really camping I have to be random camping." This was also one of the five statements for which there was no significant difference between the two samples along with "Random camping provides a unique camping experience not available at regular campgrounds" and "Random camping is an important tradition for many Albertans."

Within the category of enforcement were three statements expressing negative attitudes to random camping, such as "A fee should be charged for random camping." These statements elicited some of the strongest responses (i.e., furthest from neutral) than most other statements (Table 10). Both groups strongly disagreed with the statement "Random camping should be banned" (mean rating of 1.9 for the public and 1.6 for the campers), and both groups also disagreed with charging a fee for random camping (mean of 2.2 for both samples; not significantly different). Both groups expressed moderate agreement with the third enforcement statement ("More patrols and enforcement are needed to monitor and control

random camping"), the public having stronger agreement than the campers.

Concern over OHV Use

Unrestricted OHV use is a concern for land managers in the region. Five potential negative impacts of unrestricted OHV use were presented: disturbance to wildlife, conflict with other users, damage to trails, impacts on water quality, and shortcutting. Both campers and the public expressed concern (mean rating > 3.0) about all five impacts (Table 11). The public sample was significantly more concerned than the camper sample about the possible disturbance to wildlife, damage to existing trails, and impacts on water quality (Table 11).

Table 8. Activities pursued by the public on trips to the Clearwater Forest Area

	Trips per year with participation in the activity; % of public sample					
Activity	0 trips	1–2 trips	3–5 trips	5–10 trips	> 10 trips	Overall
Just relaxing	12.0	47.3	25.4	8.6	6.8	88.1
Fishing	55.6	23.1	10.6	6.0	4.7	44.2
Mountain biking	88.0	9.1	1.8	0.8	0.3	12.0
Birdwatching (using binoculars to identify birds)	86.5	9.4	2.3	0.5	1.3	13.5
Day hiking	52.5	31.2	10.9	3.4	2.1	47.6
Backpacking	88.0	8.3	2.9	0	0.8	12.0
Camping	20.0	39.7	22.1	9.9	8.3	80.0
Lake based canoeing/kayaking/sailing	87.3	9.4	2.6	0.5	0.3	12.8
White water canoeing/kayaking/rafting	93.2	4.9	1.0	0.5	0.3	6.7
Photographing nature	68.8	20.0	6.0	2.6	2.6	31.2
Sightseeing in natural areas	44.7	32.7	13.5	4.9	4.2	55.3
Gathering forest products (i.e., berries, mushrooms)	78.2	15.1	4.9	0.5	1.3	21.8
Swimming/beach activity	57.0	20.8	12.7	6.8	2.6	42.9
Viewing other wildlife	60.5	20.8	10.0	4.2	4.4	39.4
Horseback riding	85.2	11.4	2.3	0.5	0.5	14.7
Power boating	86.5	6.2	3.7	1.7	1.9	13.5
Using off-highway vehicles (ATV, dirt bike, quad)	76.4	9.1	7.0	4.7	2.9	23.7
Partying	84.9	9.9	2.9	1.0	1.3	15.1
Snowmobiling	90.1	4.9	2.9	1.0	1.0	9.8
X-country skiing/snowshoeing	91.4	4.9	2.3	0.5	0.9	8.6
Hunting	82.3	8.3	4.4	2.3	2.6	17.6

Note: All statements in this table appear as they appeared in the original survey. ATV = all-terrain vehicle.

Table 9. Activities most often pursued by the public on trips to the Clearwater Forest Area

Activity	% of public sample
Just relaxing	21.8
Fishing	8.7
Mountain biking	0.9
Birdwatching (using binoculars to identify birds)	0.6
Day hiking	5.4
Backpacking	0.3
Camping	25.7
Lake based canoeing/kayaking/sailing	0.3
White water canoeing/kayaking/rafting	1.5
Photographing nature	0.9
Sightseeing in natural areas	9.0
Gathering forest products (i.e., berries, mushrooms)	1.2
Swimming/beach activity	6.0
Viewing other wildlife	0.9
Horseback riding	4.2
Power boating	1.8
Using off-highway vehicles (ATV, dirt bike, quad)	2.4
Partying	0.9
Snowmobiling	1.8
X-country skiing/snowshoeing	0.3
Hunting	4.2
Other	1.5

Note: All statements in this table appear as they appeared in the original survey. Sum may not equal 100 due to rounding. ATV = all-terrain vehicle.

Table 10. Attitudes toward random camping

Statement about random camping	Public sample		Camper sample	
	Mean rating[a] (SD)	*n*	Mean rating[a] (SD)	*n*
Environmental effects				
Random camping pollutes rivers and streams[b]	2.5 (1.1)	406	2.2 (1.0)	848
In most cases, camp fires are safely attended to at random campsites[b]	3.5 (1.0)	411	3.7 (1.0)	848
Random campers leave garbage behind in the forest[b]	3.0 (1.1)	409	2.7 (1.1)	845
Random camping allows people to be more in touch with nature	3.8 (0.9)	415	4.0 (0.9)	846
Random camping helps maintain a connection with nature[b]	3.7 (0.9)	412	3.8 (0.9)	846
Random camping increases the risk of forest fire[b]	3.3 (1.1)	413	2.9 (1.2)	848
Random camping degrades the environment[b]	2.6 (1.1)	408	2.4 (1.1)	838
Random campers can help monitor gradual environmental changes[b]	3.4 (0.9)	411	3.5 (0.9)	846
Camping style				
Random camping is a good way to test outdoor skills[b]	3.6 (1.0)	417	3.9 (0.9)	850
Random camping provides a unique camping experience not available at regular campgrounds	4.0 (0.9)	409	4.1 (0.9)	851
Many random campers make excessive noise and cause trouble[b]	2.6 (1.1)	411	2.4 (1.0)	843
Random camping allows people more freedom than traditional campgrounds[b]	3.8 (0.9)	415	4.0 (0.8)	848
Random camping on Crown land is a basic right of Albertans[b]	3.6 (1.1)	411	3.8 (1.1)	848
Generally, I do not have much in common with people who random camp[b]	2.6 (1.1)	413	2.2 (1.0)	848
Random camping is an important tradition for many Albertans	3.8 (0.9)	415	3.9 (0.9)	847
In order to feel like I am really camping, I have to be random camping	2.8 (1.1)	414	2.8 (1.2)	851
Enforcement				
A fee should be charged for random camping	2.2 (1.2)	412	2.2 (1.2)	849
Random camping should be banned[b]	1.9 (1.0)	409	1.6 (0.9)	846
More patrols and enforcement are needed to monitor and control random camping[b]	3.4 (1.1)	406	3.1 (1.2)	849

[a]Rated on a scale of 1 to 5, where 1 = strongly disagree and 5 = strongly agree.

[b]Significant difference with *t*-test at 0.05 level.

Note: SD = standard deviation. All statements in this table appear as they appeared in the original survey.

Table 11. Level of concern about potential negative impacts of off-highway vehicle use

Concern	Public sample		Camper sample	
	Mean rating[a] (SD)	*n*	Mean rating[a] (SD)	*n*
Disturbance to wildlife (e.g., noise and possible harassment)[b]	3.9 (1.1)	428	3.7 (1.2)	845
Conflict with other user groups (e.g., hikers or horseback riders)	3.4 (1.2)	426	3.3 (1.3)	842
Damage to existing trails[b]	3.9 (1.0)	424	3.7 (1.2)	841
Impacts on fish habitat or water quality (e.g., accelerated erosion, siltation of waterways, pollution)[b]	4.1 (1.0)	429	4.0 (1.1)	845
Shortcutting (e.g., development of new trails)	4.0 (1.0)	427	3.9 (1.1)	839

[a]Rated on a scale of 1 to 5, where 1 = not at all concerned and 5 = very concerned.

[b]Significant difference with *t*-test at 0.05 level.

Note: SD = standard deviation. All statements in this table appear as they appeared in the original survey.

Forest Management

Value Orientation

Value orientation represents an individual's general beliefs about forests. It is important to understand the value orientation of stakeholders because it provides an indication of their preferred management philosophy (Steel et al. 1994; McFarlane and Boxall 2000), it has been used to predict management preferences and attitudes toward forest management (McFarlane and Boxall 2000), and it has been used to segment stakeholders (McFarlane and Boxall 1999, 2000).

In this study, a biocentric–anthropocentric dichotomy was used to represent value orientation. A biocentric orientation recognizes the inherent worth of nature, whereby forests have the right to exist for their own sake regardless of their usefulness to humans, forests are valued even if they are not used (existence value), and forests have spiritual value. An anthropocentric orientation emphasizes the utilitarian aspects of nature, whereby the value of forests lies primarily in the products and services they provide for human use. As noted by Steel et al. (1994), biocentric and anthropocentric value orientations are not mutually exclusive, and individuals have been shown to exhibit a mix of these two types of orientations (McFarlane and Boxall 2000).

The public and camper samples showed a high level of similarity in their responses on value orientation, with a statistically significant difference on only one statement (Table 12). Generally, both groups showed strong support for the biocentric-oriented values. Existence values indicate whether a person values the forests either as a resource for future generations or in terms of just knowing they exist. Both campers and the public showed strong agreement with the two statements in this category (mean rating of 4.9 for both groups, both statements).

Inherent worth statements indicate whether people feel that all living things have a right to exist. Campers and the public agreed with the statements "Forests should have the right to exist for their own sake, regardless of human concerns and uses" and "Wildlife, plants, and humans should have equal rights to live and develop" (mean of 4.1 for both groups, both statements).

Both groups were neutral on the statement "Forests should be left to grow, develop, and succumb to natural forces without being managed by humans."

Spiritual value statements indicate the level of philosophical attachment that people have with the forest, ranging from the religious ("Forests are sacred places") to the more personal ("Forests let us feel close to nature"). Both campers and the public agreed strongly with statements suggesting that forests make us feel better, such as feeling close to nature or giving a sense of well-being. They also agreed, but less strongly, with the

Table 12. Forest value orientation scores

Value orientation statement	Public sample		Camper sample	
	Mean rating[a] (SD)	*n*	Mean rating[a] (SD)	*n*
Existence values				
Whether or not I get to visit the forest as much as I like, it is important for me to know that forests exist in Alberta	4.9 (0.4)	426	4.9 (0.4)	853
It is important to maintain the forests for future generations	4.9 (0.3)	426	4.9 (0.4)	851
Inherent worth				
Forests should have the right to exist for their own sake, regardless of human concerns and uses	4.1 (1.1)	421	4.1 (1.0)	850
Forests should be left to grow, develop, and succumb to natural forces without being managed by humans	3.0 (1.3)	425	3.0 (1.2)	849
Wildlife, plants, and humans should have equal rights to live and develop	4.1 (1.1)	426	4.1 (1.0)	849
Spiritual values				
Forests are sacred places	3.8 (1.2)	422	3.8 (1.2)	850
Forests give us a sense of peace and well-being	4.7 (0.6)	427	4.7 (0.5)	851
Forests let us feel close to nature	4.7 (0.6)	428	4.7 (0.5)	852
Forests rejuvenate the human spirit	4.3 (0.8)	422	4.4 (0.7)	850
Humans should have more respect and admiration for the forests	4.7 (0.6)	426	4.7 (0.6)	852
Economic or utilitarian values				
Forests should be managed to meet as many human needs as possible	3.6 (1.4)	426	3.5 (1.4)	851
If forests are not threatened by human actions, we should use them to add to the quality of human life	4.1 (1.0)	419	4.1 (1.0)	845
Forests that are not used for the benefit of humans are a waste of our natural resources[b]	1.7 (1.2)	426	1.6 (1.0)	852
Forests can be improved through management by humans	4.0 (1.0)	425	3.9 (1.0)	848
Forests should exist mainly to serve human needs	2.1 (1.2)	421	2.0 (1.1)	849
The primary function of forests should be for products and services that are useful to humans	2.1 (1.1)	426	2.0 (1.0)	849

[a]Rated on a scale of 1 to 5, where 1 = totally disagree and 5 = totally agree.

[b]Significant difference with *t*-test at 0.05 level.

Note: SD = standard deviation. All statements in this table appear as they appeared in the original survey.

statement "Forests rejuvenate the human spirit" (mean rating of 4.3 for the public and 4.4 for campers). They agreed less strongly still with the statement "Forests are sacred places" (mean rating of 3.8 for both groups).

Economic or utilitarian values indicate how people deem forests should be used by humans. These values were assessed by statements such as "Forests should be managed to meet as many human needs as possible" and "Forests should exist mainly to serve human needs." Respondents were of mixed opinions regarding these statements, seemingly agreeing with statements that reflected sustainable management and rejecting statements suggesting that forests are just a resource, similar to an agricultural crop. Both groups disagreed with the two statements suggesting that forests should exist primarily to serve human needs (mean rating of 2.1 for the public and 2.0 for campers for both statements). They agreed with the 2 statements suggesting that forests can be improved with human management and that they can be used if it does them no harm. The one statement where there was a statistically significant difference between the samples (although both groups disagreed strongly) was "Forests that are not used for the benefit of humans are a waste of our natural resources" (mean rating of 1.7 for the public and 1.6 for campers).

In summary, the public and the campers had very similar value orientations. They valued forests for their existence and for their spiritual, and inherent worth but not to the exclusion of human use of the forest.

Attitudes toward Forest Management in Alberta

The 14 statements concerning forest management were divided into four categories; multiple benefits, the sustainability of timber yield, the economic benefits of forestry, and public involvement in forest management. The multiple benefits category measured beliefs about management for uses other than fiber and included managing for future generations, protected areas, and environmental concerns (Table 13). Campers and the public agreed that forests are being managed for a range of uses and values. However, they did not agree that forestry produces few long-term negative effects on the environment and that Alberta has enough protected areas. There was agreement, but with a significant difference between the samples, with the statement "Forest management does a good job at including environmental concerns" (mean rating of 3.6 for the public and 3.4 for campers). The samples differed significantly, and in opposite directions, on the statement "Forests are being managed successfully for the benefit of future generations" (mean rating of 3.1 for the public and 2.9 for the campers).

The category on sustained timber yield contained 3 statements about whether current practices will allow for continued long-term harvesting of the forest. Both samples appeared not to have well-formed beliefs about timber supply (Table 13). Campers and the public agreed that the current rate of logging is too great to sustain forests. However, the statements that there will be sufficient wood for the future and that enough harvested trees are being replaced to meet future timber needs were rated about neutral (mean ratings of 2.9 and 3.0, respectively).

Both samples disagreed, to the same degree, with the two statements concerning economic benefits of forestry (Table 13). The mean rating for the groups was approximately 2.3 for the statement that "economic benefits from forestry usually outweigh any negative consequences," as well as the statement that "economic stability of communities is more important than setting aside forests from logging."

The public involvement category contained statements to determine if the respondents believed the public has enough input into forest management (Table 13). Both campers and the public disagreed that "the citizens of Alberta have enough say in forest management" and agreed that "the forest industry controls too much of Alberta's forests." However, they also agreed with the statement that "communities that depend on the forest for their economic well-being are given adequate consideration in forest management." There was a statistically significant difference between the two samples for the statement "When making forest decisions the concerns of communities close to the forest should be given higher priority than other distant communities" (mean rating of 3.8 for the public and 3.6 for campers) (the public sample were all living in local communities of the Clearwater Forest Area, as described in the Methods [sample selection]). These results suggest that campers and residents of central Alberta (most of whom do not live in forest-dependent communities) may feel excluded from forest management decisions.

Table 13. Attitudes toward forest management

Attitude statement	Public sample		Camper sample	
	Mean rating[a] (SD)	*n*	Mean rating[a] (SD)	*n*
Multiple benefits				
Forests are being managed successfully for a wide range of uses and values, not just timber	3.6 (1.1)	425	3.5 (1.0)	844
Forest management does a good job at including environmental concerns[b]	3.6 (1.1)	422	3.4 (1.1)	848
Alberta has enough protected areas such as provincial and national parks or wilderness areas	2.9 (1.4)	424	2.8 (1.3)	847
Forests are being managed successfully for the benefit of future generations[b]	3.1 (1.2)	425	2.9 (1.1)	846
Forestry practices generally produce few long-term negative effects on the environment	2.5 (1.2)	423	2.5 (1.1)	844
Sustained timber yield				
The present rate of logging is too great to sustain our forests in the future	3.6 (1.1)	425	3.5 (1.0)	843
There will be sufficient wood in Alberta to meet our future needs	2.9 (1.2)	425	2.9 (1.1)	842
Enough harvested trees are being replaced by planting new ones or by natural seeding to meet our future timber needs	3.0 (1.2)	425	3.0 (1.1)	846
Economic development				
The economic benefits from forestry usually outweigh any negative consequences	2.3 (1.1)	421	2.4 (1.1)	844
Economic stability of communities is more important than setting aside forests from logging	2.3 (1.1)	422	2.3 (1.0)	844
Public involvement				
Communities that depend on the forest for their economic well-being are given adequate consideration in forest management	3.2 (0.9)	420	3.2 (0.8)	845
When making forest decisions, the concerns of communities close to the forest should be given a higher priority than other distant communities[b]	3.8 (1.2)	425	3.6 (1.2)	849
The forest industry controls too much of Alberta's forests	3.4 (1.1)	423	3.4 (1.0)	843
The citizens of Alberta have enough say in forest management[b]	2.4 (1.1)	421	2.3 (1.0)	847

[a]Rated on a scale of 1 to 5, where 1 = totally disagree and 5 = totally agree.

[b]Significant difference with *t*-test at 0.05 level.

Note: SD = standard deviation. All statements in this table appear as they appeared in the original survey.

These results also suggest that although the public and campers believe that forestry management addresses environmental concerns well, they also believe that forestry may have long-term negative environmental effects. They are not convinced that there is adequate timber supply to meet future needs, and they believe that the economic benefits of forestry should not necessarily be given priority over other issues such as setting aside forests from logging. Although the groups believed that forest-dependent communities have enough say in forest management and that communities close to the forest (e.g., Rocky Mountain House) should have more input than more distant communities (e.g., Edmonton), they also believed that the public does not have enough say, which suggests that these 2 groups feel left out of forest management decisions.

Threats to the Environment

Industrial activities were rated as posing the greatest threats to the environment. Oil and gas development and exploration received the highest rating (mean > 4.0 for both samples; Table 14), followed closely by combined effects of all activities and forestry. Cattle grazing, another commercial activity pursued in the region's forest, was not seen as a threat. The only recreational activity rated as threatening was OHV use. Neither group rated nonmotorized recreational activities (such as biking or hiking) or consumptive activities (hunting and fishing) as a threat.

There were some statistically significant differences between the public and camper samples in how threats were rated, but overall, these were a matter of degree. In other words, there were no activities perceived as a threat by one group and as nonthreatening by the other (Table 14). The threat associated with creating access to the forest, as well as how such access was accomplished, was perceived differently by the two groups. Although both groups rated creating access (all sources of roads, cutlines, etc.) as a threat, the public was significantly more concerned about this activity than the campers. The camper sample had a greater concern about horseback travel than the public, although both groups rated this activity as not threatening. In contrast, the public showed greater concern over OHV use than the campers. The public was also significantly more concerned about random camping than the camper sample, but neither group rated this activity as a threat. The public was significantly more concerned than the campers about the combined effects of all human use.

Respondents were also asked to rank these threats to environmental quality (Table 15). Within the public sample, the two human activities most often cited as the greatest threat were oil and gas exploration and development (32.1% of respondents) and OHV use (24.0%). The combined effects of all activity and forestry were ranked first by smaller but about equal proportions of respondents (approximately 17%). The three activities cited the most often by the public as the second greatest threat were oil and gas exploration and development (32.4%), forestry (22.1%), and OHV use (17.4%). As the third greatest threat, the public chose combined effects (22.4%), OHV use (18.3%), and forestry and oil and gas (approximately 15% each).

The camper sample perceived the same activities as threatening, but the ranking was not the same. As the greatest threat, the campers chose the oil and gas industry (41.5%), forestry operations (22.4%), and OHV use (17.7%). The same activities were ranked highest as posing the second greatest threat (32.2%) for the oil and gas industry, 28.1% for forestry, and 15.1% for OHV use. The activities cited as the third greatest threat, by most campers were OHV use (24.0%), forestry (18.8%), and the oil and gas industry, creating access, and combined effects (all about 13.0%).

Assuming that no respondent listed the same activity representing the top three threats, it is possible to sum the responses to determine which activities were consistently among the top three perceived threats. With this approach, oil and gas exploration and development was perceived as the greatest threat to environmental quality in the region, being cited by over 80% of the respondents in each sample. OHV use was perceived as a threat by both samples (59.7% of the public and 56.8% of the campers). Of the other threats, only two had combined scores of over 50% in at least one sample: forestry and combined effects. The importance of each of these was noticeably different between the two samples. Forestry operations were perceived as a greater threat by the campers (69.3% of campers and only 53.8% of the public). The combined effects of all human activity was mentioned by 50.8% of the public, but a surprisingly low 30.9% of the camper sample. Perhaps inclusion of "recreational activities" as part of the combination led campers to reflect on the effect of their own activity and to downplay this potential threat.

Table 14. Perceptions of the threat to environmental quality posed by human activity

Activity	Public sample		Camper sample	
	Mean rating[a] (SD)	*n*	Mean rating[a] (SD)	*n*
Horse travel in the backcountry[b]	1.8 (1.0)	421	2.0 (1.1)	846
Motorized off-highway vehicle use (ATVs, snowmobiles, motorbikes)[b]	3.8 (1.2)	424	3.6 (1.2)	848
Forestry (tree-harvesting operations, road-building, etc.)	3.9 (1.0)	422	3.9 (1.0)	843
Nonmotorized recreational activities (e.g., bicycling, hiking)	1.8 (0.9)	422	1.8 (0.9)	844
Oil and gas exploration and development (pipelines, seismic activities, well-sites, sour gas flaring, roads, etc.)	4.1 (1.0)	425	4.1 (0.9)	847
Random camping (bush camping outside campgrounds)[b]	2.6 (1.2)	421	2.4 (1.1)	849
Cattle grazing on Crown land	2.5 (1.2)	421	2.6 (1.3)	848
Creating access to the forest (all sources of roads, cutlines, trails, etc.)[b]	3.4 (1.1)	422	3.2 (1.1)	845
Effects of all forestry, oil and gas, and recreational activities combined over the whole region[b]	3.9 (1.0)	420	3.8 (1.0)	837
Hunting and fishing	2.1 (1.1)	421	2.0 (1.0)	849

[a]Rated on a scale of 1 to 5, where 1 = not at all threatening and 5 = very threatening.
[b]Significant difference with *t*-test at 0.05 level.
Note: SD = standard deviation. All statements in this table appear as they appeared in the original survey.

Table 15. Ranking of threats to environmental quality posed by human activity

Perceived threat	Sample; % listing a given threat					
	Public			Camper		
	Greatest threat (*n* = 415)	Second greatest threat (*n* = 415)	Third greatest threat (*n* = 399)	Greatest threat (*n* = 814)	Second greatest threat (*n* = 792)	Third greatest threat (*n* = 728)
Horse travel in the backcountry	0.2	0	1.2	0.4	0.8	1.9
Motorized off-highway vehicle use (ATVs, snowmobiles, motorbikes)	24.0	17.4	18.3	17.7	15.1	24.0
Forestry (tree-harvesting operations, road-building, etc.)	16.6	22.1	15.1	22.4	28.1	18.8
Nonmotorized recreational activities (e.g., bicycling, hiking)	0.3	0	0.9	0.1	0.5	0.3
Oil and gas exploration and development (pipelines, seismic activities, well-sites, sour gas flaring, roads, etc.)	32.1	32.4	15.9	41.5	32.2	12.6
Random camping (bush camping outside campgrounds)	0.7	4.4	5.2	0.7	3.1	4.4
Cattle grazing on Crown land	2.1	4.0	6.8	2.21	2.8	9.6
Creating access to the forest (all sources, roads, cutlines, trails, etc.)	4.1	7.2	10.9	3.3	6.6	12.5
Effects of all forestry, oil and gas, and recreational activities combined over the whole region	17.1	11.3	22.4	9.1	9.0	12.8
Hunting and fishing	0.8	0.4	2.0	0.6	0.2	1.1
Other	1.9	0.8	1.1	1.7	1.0	1.2

Note: All statements in this table appear as they appeared in the original survey. Column sums may not equal 100 due to rounding.

Concerns over the Effect of Forestry Operations

Both groups were concerned about all of the potential impacts of forestry—on wildlife, water, scenic beauty, soil, and ecological integrity—as well as combined effects. Water quality and fish habitat impacts received the highest threat rating from both the public (mean 4.2) and campers (mean 4.4).

In most instances, the campers indicated greater concern than the public (Table 16), but the difference was significant in only six instances. The campers were significantly more concerned about effects on game and nongame species, ecosystem integrity, water quality or fish habitat, the number and variety of plant and animal species, and scenery or visual quality of the landscape.

Respondents were asked to rank these potential impacts of forestry operations (Table 17). For both groups, only 2 impacts were listed by a large proportion of respondents as the greatest concern: impact on water quality or fish habitat (by 27.5% of the public% and 27.2% of campers) and ecosystem integrity (by 23.5% of the public and 28.8% of campers). The public sample mentioned water quality (21.6%), ecosystem integrity (15.4%), and cumulative effects (12.5%) as being of second greatest concern. The results for campers were similar, with a difference in degree: water quality by 23.9%, cumulative effects by 12.3%, and ecosystem integrity by 11.4%. The impacts most often mentioned as being of third greatest concern were not noticeably different between the samples: water quality was cited by about 13%, cumulative effects by about 12%, and visual quality by 10–12%.

The summation approach used to determine the most frequently cited threats to the environment was also applied to the impacts of forestry operations. The impact of most concern to both samples was damage to water quality (mentioned by 62.4% of the public and 64.1% of the campers). The next most often mentioned was potential damage to ecosystem integrity (mentioned by 46.5% of the public and 50.4% of campers). No other potential impact was mentioned as one of the top three concerns by a majority of either sample.

Table 16. Level of concern about potential negative impacts of forestry operations

	Public sample		Camper sample	
Environmental aspect affected	Mean rating[a] (SD)	*n*	Mean rating[a] (SD)	*n*
Nongame species (e.g., songbirds, wolverines)[b]	3.4 (1.1)	424	3.7 (1.1)	832
The impact on the number and variety of plant/animal species (i.e., biodiversity)[b]	3.8 (1.0)	414	3.9 (0.9)	828
Game species (e.g., moose, grouse)[b]	3.7 (1.1)	423	3.9 (1.1)	832
Soil erosion	4.0 (0.9)	416	3.9 (0.9)	828
Soil degradation (e.g., reduced soil quality, soil compaction)	3.7 (1.0)	421	3.8 (0.9)	823
Water quality or fish habitat impacts (e.g., polluting our streams and rivers)[b]	4.2 (1.1)	422	4.4 (0.8)	833
Watershed impacts (timing and volume of water flows)	3.8 (1.0)	423	3.9 (0.9)	826
Ecosystem integrity (i.e., normal functioning of the whole environment)[b]	3.8 (1.1)	416	4.1 (1.0)	832
Too much access to forests (road-building)	3.8 (1.1)	423	3.8 (0.9)	832
Cumulative effects from forestry (adding up everything)	3.7 (1.1)	412	4.1 (0.8)	827
Scenery or visual quality of landscape[b]	3.8 (1.1)	423	4.0 (1.0)	833

[a]Rated on a scale of 1 to 5, where 1 = not at all concerned and 5 = very concerned.

[b]Significant difference with *t*-test at 0.05 level.

Note: SD = standard deviation. All statements in this table appear as they appeared in the original survey.

Table 17. Ranking of concerns about potential negative impacts of forestry operations

Environmental aspect affected	Sample; % listing a given concern					
	Public			Camper		
	Greatest threat (n = 399)	Second greatest threat (n = 396)	Third greatest threat (n = 389)	Greatest threat (n = 778)	Second greatest threat (n = 771)	Third greatest threat (n = 747)
Nongame species (e.g., songbirds, wolverines)	3.1	2.7	2.1	2.7	3.8	5.3
The impact on the number and variety of plant/animal species (i.e., biodiversity)	2.2	7.3	10.5	3.2	8.0	9.6
Game species (e.g., moose, grouse)	3.7	4.7	8.0	6.3	6.9	10.4
Soil erosion	7.1	10.0	8.8	3.9	6.6	7.9
Soil degradation (e.g., reduced soil quality, soil compaction)	1.8	3.2	9.5	0.6	3.0	4.4
Water quality or fish habitat impacts (e.g., polluting our streams and rivers)	27.5	21.6	13.3	27.2	23.9	13.0
Watershed impacts (timing and volume of water flows)	6.6	8.9	9.8	3.3	7.6	5.9
Ecosystem integrity (i.e., normal functioning of the whole environment)	23.5	15.4	7.6	28.8	11.4	10.2
Too much access to forests (road-building)	8.6	8.8	7.3	7.6	9.7	8.4
Cumulative effects from forestry (adding up everything)	11.4	12.5	12.8	9.9	12.3	12.2
Scenery or visual quality of landscape	4.0	4.0	10.4	6.0	6.7	12.4

Note: All statements in this table appear as they appeared in the original survey. Column sums may not equal 100 due to rounding.

Knowledge of Forests and Forest Management

The two samples had similar self-ratings of their knowledge of forests (Table 18); more than half were somewhat informed (56.8% of the public and 54.2% of campers), and about a quarter were somewhat not informed (21.3% of the public and 23.8% of campers). Only 4.8% of the public and 10.0% of campers rated themselves as very well informed; 14.5% and 10.2%, respectively, were not at all informed. A very small proportion were not sure how well informed they were (2.7% of the public and 1.8% of campers).

The majority of respondents in both samples answered at least half of the true or false questions correctly (63.1% of the public and 66.4% of campers). Less than 6% achieved a score below 2, and less than 3% had a score above 8 (Table 19). There was no noticeable difference in knowledge levels between the public and the campers.

The responses of the groups to each statement are listed in Table 20. For most of true or false statements, significant proportions of respondents answered "not sure," ranging from highs of about 65% for the statement concerning woodland caribou and about 52% for the statement about how much of Alberta's forests are protected to a low of approximately 12% for three other statements (whether forest companies had to follow government regulations in their operations, whether there is a natural replacement of trees in a forest, and whether trees must be replanted in harvested areas in order for the forest to regrow. Only one statement had more incorrect than correct responses: "Over 20% of Alberta's forests are protected by legislation from resource extraction" (36.0% incorrect and 11.2% correct among the public, 39.7% incorrect and 8.0% correct among the campers).

Table 18. Self-rating of knowledge of forests and management

	Sample; % of respondents	
Self-rating	Public (n = 428)	Camper (n = 847)
Not at all informed	14.5	10.2
Somewhat not informed	21.3	23.8
Somewhat informed	56.8	54.2
Very well informed	4.8	10.0
Not sure	2.7	1.8

Table 19. Results of test of forest management knowledge

	Sample; % with correct answers	
No. correct	Public (n = 435)	Camper (n = 857)
0	2.3	2.6
1	3.3	1.6
2	6.4	4.4
3	10.4	9.2
4	14.5	15.8
5	21.1	20.4
6	16.9	21.5
7	15.1	14.1
8	7.6	7.5
9	1.9	2.8
10	0.5	0.1

Table 20. Responses on test of forest management knowledge

Test statement	Correct answer	Sample; % with given response							
		Public				Camper			
		True	False	Not sure	*n*	True	False	Not sure	*n*
There are no old-growth forests in Alberta	False	7.2	68.8	24.0	422	5.3	74.1	20.6	845
Alberta has more softwood than hardwood forests	True	63.8	4.8	31.4	420	62.2	9.7	28.1	843
Over 20% of Alberta's forests are protected by legislation from resource extraction such as forestry and oil and gas development	False	36.0	11.1	52.9	420	39.7	8.0	52.4	844
Clear-cutting is the most common method of harvesting trees in Alberta	True	56.6	20.3	23.1	426	62.7	15.7	21.5	845
Most of Alberta's forested land is owned by the provincial government	True	60.7	14.1	25.2	428	65.4	10.6	24.0	846
Forest companies are required to follow government guidelines when harvesting timber	True	85.7	2.1	12.2	427	88.9	1.7	9.5	844
Over time, these is a natural replacement of the trees in a forest	True	67.7	19.6	12.8	427	68.9	19.1	12.0	844
The woodland caribou like old-growth forest but thrive in young, planted forests	False	22.3	14.2	63.5	422	19.5	15.2	65.3	847
All areas where trees are harvested must be replanted in order for the forest to regrow	False	45.0	42.1	12.9	425	40.2	43.5	16.3	846
The forest industry contributes more to Alberta's economy than the tourist industry	True	35.5	19.7	44.8	424	35.7	17.2	47.1	845

Note: All statements in this table appear as they appeared in the original survey.

Types of Media and Information Sources

Campers and the public obtained information about forestry in Alberta from several sources, in particular, newspaper, television, word-of-mouth, and radio. Newspapers and television were used by at least 75% of each sample, word-of-mouth by about 60%, and radio by about 50% (Table 21). Although printed materials were used by a minority of both groups, more campers used printed materials. Brochures were used by 40.2% of campers and 25.3% of the public and books by 21.8% of campers and 15.0% of the public. No other media achieved higher than 11% of both samples, including the most popular methods currently used to increase public involvement in forest management, such as open houses, public meetings, presentations, and tours.

Sources for information about forest management in Alberta were similar for campers and the public. Four sources were used by about 50% of respondents (Table 22). Word of mouth was

the most common (used by 57.6% of the public and 54.7% of campers) followed by the provincial government (51.6% and 52.8%, respectively), environment or conservation groups (49.0% and 46.4%, respectively), and the forest industry (44.6% and 42.3%, respectively). The only other source with an appreciable use was forest scientists (about 28% of both samples).

Respondents did not necessarily trust the sources used to provide reliable and accurate information. They were asked which single source they trusted most and which single source they trusted least. For both samples the most trusted source was forest scientists (29.0% of the public and 31.4% of campers) (Table 23). Despite being among the 4 main sources of information used, environmental groups, and the provincial government were trusted most by only 17–18% of each sample. The samples differed in terms of trust of the forest industry, with 16.9% of the public and 12.2% of campers indicating that the industry was their most trusted source. Although most respondents received information by word of mouth, less than 10% of each sample listed this as the most trusted source.

For both groups, the least trusted source was the forest industry (24.6% of the public and 28.4% of the campers) (Table 24). Word of mouth and environmental groups were the next least trusted, at approximately 20% each for both samples. The provincial and federal governments were equally mistrusted, by 13–14% of each sample. Although universities and think tanks were not the most trusted source for most respondents, neither were they the least trusted sources.

Tables 23 and 24 also show divisions within each sample; for example, environmental groups were the second most trusted source for both groups but also the second (campers) or third (public) least trusted source.

Table 21. Media used to obtain forest management information

	Sample; % of respondents	
Medium	Public (n = 425)	Camper (n = 854)
Newspaper	77.2	81.5
Television	76.0	75.5
Radio	48.2	51.3
Open houses	8.2	5.7
The Internet	9.5	16.6
Presentations	10.2	10.3
Books	15.0	21.8
Public meetings	10.7	7.6
Brochures	25.3	40.2
Tours	8.3	8.4
Word of mouth (friends, relatives, etc.)	61.4	62.1
None (no interest)	1.7	1.4

Table 22. Source used to obtain forest management information

	Sample; % of respondents	
Source	Public (n = 413)	Camper (n = 847)
Environment or conservation groups	49.0	46.4
Forest industry	44.6	42.3
Provincial government	51.6	52.8
Federal government	12.6	11.8
Forest scientists (e.g., biologists, ecologists)	28.3	28.0
Think tanks (e.g., Fraser or Pembina institute)	6.4	6.3
Universities	8.3	8.8
Word of mouth (friends, relatives, etc.)	57.6	54.7

Table 23. Most trusted source of forest management information

Source	Sample; % of respondents	
	Public (n = 398)	Camper (n = 764)
Environmental or conservation groups	17.9	18.6
Forest industry	16.9	12.2
Provincial government	17.1	17.2
Federal government	1.0	1.6
Forest scientists (e.g., biologists, ecologists)	29.0	31.4
Think tanks (e.g., Fraser or Pembina institute)	2.4	2.5
Universities	3.0	4.1
Word of mouth (friends, relatives, etc.)	9.5	9.2

Table 24. Least trusted source of forest management information

Source	Sample; % of respondents	
	Public (n = 385)	Camper (n = 769)
Environmental or conservation groups	20.5	21.3
Forest industry	24.6	28.4
Provincial government	12.8	13.1
Federal government	13.9	14.4
Forest scientists (e.g., biologists, ecologists)	2.7	0.6
Think tanks (e.g., Fraser or Pembina institute)	3.2	3.0
Universities	0.8	1.0
Word of mouth (friends, relatives, etc.)	21.5	18.1

Camper Interest in Forest Management

The camper survey included two additional questions, one asking what forest management activities campers would like to learn more about and a second asking which of these forestry management activities they were most concerned about. Within the list of activities they would like to learn more about, respondents were asked to check all that applied. Overall, there was not overwhelming interest in learning more about any of the forest management activities in the Clearwater Forest Area. However, only 5.7% of respondents indicated they had no interest at all (Table 25). Four of the topics had the interest of more than half the sample: wildlife considerations (64.0%), reforestation (60.1%), water protection (59.5%), and forest protection (55.4%). Another three were of interest to about 42%: planning, land use, and regulations. Log hauling was the least interesting, with only 16.6% of respondents indicating an interest in learning about this topic.

Not surprisingly, given the interests identified above, water protection and wildlife consideration were the top-rated activities of concern and were listed as one of the top three concerns by slightly over half of respondents (Table 26); among activities of most concern water protection was identified by 22.8% and wildlife consideration by 18.5%. Reforestation and forest protection, the other two activities that a majority of respondents wanted to learn more about, were of less concern, with only about 40% citing them as one of the top three concerns. The three activities for which about 40% of respondents expressed a desire to learn more (planning, land use, and regulations) were one of the three top concerns for about 20% of respondents. It is interesting to note that public involvement, which was an area that 33.6% of respondents wanted to learn more about, was a major concern for less than 10%. These concerns can, to some extent be related to the question about the potential negative impact of forest operations (Table 16). In that question, respondents also expressed strong concern about impacts on wildlife and water. While forest protection and reforestation were not considered explicitly, that question did relate somewhat to ecosystem integrity, which was a concern as a potential impact. As well, in their attitudes to forest management, (Table 13), camper respondents did not believe that current logging and tree planting would lead to sustained timber yield.

Table 25. Camper interest in forest management activities in the region

Activity	% who wanted to learn more
Planning	42.3
Reforestation	60.1
Road construction	26.7
Water protection	59.5
Log hauling	16.6
Wildlife consideration	64.0
Harvesting	33.5
Land use	42.6
Regulations	42.9
Areas harvested	27.2
Forest protection	55.4
Public involvement	33.6
None (no interest)	5.7

Note: Sum does not add to 100 because responents were asked to check all that apply.

Table 26. Camper concern about forest management activities in the region

	Level of concern; % of campers		
Activity	Most concerned (n = 751)	Second most concerned (n = 741)	Third most concerned (n = 722)
Planning	10.2	3.2	5.7
Reforestation	14.0	11.5	12.2
Road construction	4.9	5.7	4.6
Water protection	22.8	20.2	12.7
Log hauling	1.2	1.9	1.9
Wildlife consideration	18.5	20.6	13.6
Harvesting	5.5	6.9	5.0
Land use	5.2	7.7	8.4
Regulations	4.1	5.4	8.6
Areas harvested	2.0	2.0	3.9
Forest protection	9.0	13.0	18.1
Public involvement	2.3	1.6	5.3

DISCUSSION

Previous studies on the recreational use of the Clearwater Forest Area suggested that local communities are the primary market areas for camping (McFarlane et al. 1996a). The respondents to the camper survey in this study consisted of 44% local residents and 56% residents of other parts of Alberta. The results from the public survey confirm that the Clearwater Forest Area is an important recreational destination for many local residents. Essentially all respondents indicated that they visited the area for some form of recreation. The activities ranged from passive sightseeing and relaxing to more active pursuits such as camping and OHV use. The most popular activities were camping, relaxing, fishing, sightseeing, and day hiking. Thus, the residents of local communities are also users of the nontimber resources in the Clearwater Forest Area, and addressing their concerns and attitudes will be important in achieving sustainable forest management in the area. Communicating forest management objectives and activities and soliciting input from these residents will be vital to gaining public support for forest management in the area.

A common perception among land managers is that random camping and OHV use, if left unmanaged, could have substantial impacts on the environment and produce conflicts among recreation users. Attitudes toward these issues provide an indication of the importance of the activities to stakeholders and possible public reaction to policy or regulation changes. In terms of random camping, the concerns of land managers were not shared by the public or campers. Overall, both groups felt that random camping was a positive experience that did not result in significant environmental impacts. Both groups viewed random camping as a tradition and a basic right of Albertans. The fact that the two samples viewed random camping as a better way to get in touch with nature than traditional managed campgrounds and as a unique experience not possible in a campground suggests that efforts to "move" random campers into managed areas may not be successful. McFarlane et al. (2003) suggested that any changes to the camping opportunities in the area could result in a substantial redistribution of campers on the landscape and recommended that any changes be implemented with caution and with more input from campers.

In contrast to the disparate views on random camping, the public and campers shared land managers' concerns over the effect of unrestricted OHV use in the area on wildlife disturbance, water quality, conflicts with other users, and short-cutting. Efforts to manage OHV use would probably be supported by local residents and many campers using the area.

Several aspects of forest management were investigated in this study, including forest value orientation, attitudes toward forest management, environmental concerns, knowledge of forest management, and information sources. The forest value orientation of the two samples showed a high level of similarity. Overall, respondents showed strong support for biocentric-oriented values but were not opposed to the human use of forests. The public sample from this study showed strong similarities to a sample from a previous study of the Alberta general public (McFarlane and Boxall 2000), which suggests that local residents in the Clearwater Forest Area have similar value orientations as other Albertans. The camper sample also showed strong similarities with campers in the Foothills Model Forest (McFarlane and Boxall 1999).

The public and the campers were also similar in their attitudes toward forest management, and these attitudes were similar to those of the general public of Alberta and campers in the Foothills Model Forest. Thus, it appears that local residents and campers using the Clearwater Forest Area are not unique in their value orientation or attitudes toward forest management; rather they are representative of the broader camper and Alberta populations. These populations seem to support the paradigm of sustainable forest management, which includes a mix of biocentric and anthropocentric objectives. However, these stakeholders were not convinced that forest management in Alberta is achieving the general principles of sustainable forest management. Although they felt that the forests are being managed for multiple benefits, they were not convinced of the long-term viability of timber supply or that public involvement is adequate, and they expressed concern over the environmental impacts of industrial activity.

Further exploration of environmental concerns showed that the oil and gas industry and forestry were the greatest perceived threats to forest sustainability in the region. The industrial use of the landscape perceived as the most threatening was oil and gas exploration and development. Forestry operations, while threatening, were not of as much concern. The camper sample showed more concern over forestry operations than the public, perhaps because of greater familiarity with the industry (they may camp in proximity to forestry activity or forestry may in some way affect their camping experience). However, when asked about concerns over specific potential negative impacts from forestry, both campers and the public were concerned about all the impacts presented. The greatest concern for both groups was potential impact on water quality or fish habitat. The camper sample was significantly more concerned about water quality than the public, perhaps because many campers also fish or depend upon streams or lakes for drinking water while camping.

The knowledge indicators used in this study suggest that the attitudes and perceptions of the public and campers are fairly well informed. In an analysis of the effect of knowledge on attitudes and environmental activism in the forest sector, McFarlane and Boxall (2003) found that increased knowledge was associated with more negative attitudes toward the sustainability of forest management and increased involvement in environmental activism. Thus, simply providing information to stakeholders on forest management practices and issues may not be enough to change their attitudes and perceptions. Other factors, such as the method of communication, the credibility of the source, and the level of trust in the information source, are also important in persuading stakeholders that forest management is sustainable (Petty et al. 1992). The results of this study show that industry and government, the primary information sources on forest management, are not well trusted, which suggests that information from third-party sources such as forest scientists may be perceived as more reliable. There does not, however, seem to be any link between the probable employers of forest scientists and the ecologists themselves. Of the potential third parties listed, universities and think-tanks were not a major source of information, and respondents were seemingly neutral in their trust of them, neither scoring high as either most trusted or least trusted. There was also a strong disparity in trust of environmental groups, with approximately 18% of each sample rating them most trusted and another 21% as least trusted.

The camper survey provided some indication of the forest management topics that respondents are interested in learning about. Most campers expressed an interest in learning about wildlife considerations, protection of water resources, reforestation efforts, and forest protection. These topics of interest are consistent with campers' concerns over the impacts of forest management; therefore, campers may be willing to learn more about these topics and perhaps re-assess their evaluation of forest management impacts. However, acceptance of the information may depend on the source, as shown by the responses to questions on trust. Any one source would not be acceptable to all respondents.

One aspect of effective communication is determining the most acceptable media for stakeholders. The major media that stakeholders in this study used for obtaining information were passive, i.e., radio, television, and newspapers. These sources are generally part of most people's daily routine. Information sources that require more effort to obtain and use, for example public meetings, tours, and open houses, were not nearly as widely used. Public meetings and open houses are often used by governments and industry to solicit public input on natural resource management. However, these media were used by 10% or less of both groups. Thus, although these stakeholders expressed concern about the way forests are managed and about the potential negative impacts on the environment, they do not seem to be involved in activities that allow them to express their concerns. Their concern may not be enough to move them to become involved directly, they may not trust those involved in public meetings or open houses, or they may not believe that their input will be considered in management decisions.

McFarlane and Boxall (2003) suggested that at least some of the Alberta public are involved but that their concerns are addressed through other means such as supporting environmental organizations, attending public protests on forest management issues, and communicating with forestry officials or politicians. Although a small proportion of Albertans engage in these activities, participation may increase in the future if Albertans continue to view forest management

as unsustainable and feel their concerns are not being addressed through conventional public input methods.

Public meetings, tours, and open houses are hosted or sponsored by the forest industry or the provincial government, both of which were among the least trusted sources of information on forest management among stakeholders in this study. Parkins et al. (2001) also found that the Alberta public does not trust the information provided by the forest industry or government but does consider scientists a trustworthy source of information. Thus, it is not surprising that public attendance at these forums is low, and they attract primarily special interest groups (e.g., Gundry and Heberlein 1984; McComas 2001) or individuals who are in agreement with current forest management practices. For example, McFarlane and Boxall (2000) found that the value orientation and attitudes of members of forest industry public advisory groups (among the most common mechanisms used by natural resource management agencies to solicit input from the general public in Alberta; Beckley, T.M. 1999. Public involvement in natural resource management in the Foothills Model Forest. Unpubl. rep. prepared for the Foothills Model Forest, Hinton, AB.) in Alberta were more similar to those of professional foresters than the general public. McFarlane and Stedman (2002) also found that tours of mills and forest operations sponsored by the forest industry attracted a limited demographic segment of the Alberta public (primarily older, less educated, and local residents) and people who hold more positive attitudes toward forest management than the general public.

Stakeholders' concerns over the environmental impacts of industrial activity, their perception of citizens not having enough say in forest management, and their lack of trust in those who manage natural resources and public involvement presents enormous challenges to those managing Alberta's natural resources. Results from this and other studies in Alberta indicate that managers should not assume that people who do not attend traditional forms of public involvement (e.g., open houses) do not have an opinion, are not concerned, or do not care about natural resource management. Indeed, these studies suggest that people are concerned and do care about natural resource management. Perhaps what the results indicate is that it will take more effort to get a truly representative cross-section of public input. This study and others that use nontraditional methods of soliciting public input (e.g., survey research and on-site interviews with forest users) are one means to expand the public involvement process. In addition, stakeholders feel that citizens should have more input in forest management, an indication that they believe their concerns are not being addressed. Addressing these concerns and gaining acceptance of forest management decisions may require forms of public input that foster deliberation, trust, and democratic decisions (Shindler et al. 2002).

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